JOURNAL OF THE NEW ZEALAND INSTITUTE OF CHEMISTRY

Vol. 24 No. 2
April, 1959

JOURNAL OF THE NEW ZEALAND INSTITUTE OF CHEMISTRY

Vol. 23, No. 2 April, 1959

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Published for the New Zealand Institute of Chemistry (Inc.), P.O. Box 250, Wellington, by

EDITORIAL SERVICES LIMITED

Ascot Chambers, 81 Ghuznee Street, Telephone 51-416.

C.P.O. Box 2721 Wellington, N.Z.

United Kingdom Advertising Representative

Walter Judd Ltd., 47 Gresham Street, London, E.C.2.

Edited by Dr W. A. McGillivray

Massey College Post Office, Palmerston North, N.Z.

EDITORIAL

Contributed by Dr C. R. Barnicoat, Associate Professor of Biochemistry, Massey College, Palmerston North, and Immediate Past-President of the N.Z.I.C.

MANY FEEL that the New Zealand Institute of Chemistry, now numbering over 500 academically qualified members, is not accorded the status it merits, either by the public or by administrative and political circles.

At this stage we might well consider the present status of the Institute and the future alternatives which face it. Is it to remain primarily a scientific body, on the traditional lines of a learned society, "promoting the science and practice of chemistry" (Rule 3.1) by means of branch meetings, an annual conference, visiting overseas lecturers, and the *Journal*? Or is it intended, in addition, to strive "to raise the status and advance the interests of the profession of chemistry and those engaged therein" (Rule 3.2) by pressing for public and political recognition? If this latter course is favoured, the time was never more opportune, since the threatened export industries and the undeveloped manufacturing undertakings of New Zealand are alike in need of scientific and technological advice and direction.

Members urging a greater participation in public affairs in order to raise the status of the Institute, and who contrast the Institute standing with that of such bodies as the British Medical Association, and the New Zealand Institution of Engineers might, however, further consider the following points.

(1) The activities of the Medical and Veterinary Associations are concerned ultimately with human health. The Institution of Engineers embraces an extraordinarily wide field of activities of everyday interest relating to the welfare of man. The aims and functions of these bodies are thoroughly well understood and appreciated by the public, whereas it is regettable, but true, that our profession is little known, and is often confused with pharmacy.

(2) The British Medical Association and the New Zealand Institution of Engineers are much larger and older societies. The Medical and Veterinary Associations, and to a con-

siderable extent the Engineers, are in a position to be monopolistic, which is an invaluable asset from the "trades union" point of view. On the other hand, the professional interests of Institute members are widespread, ranging from research, teaching at various levels, industry, and Government administration and regulatory services. Such interests, as well as being diffuse, are not always in harmony.

(3) Applied science has become virtually a Government monopoly in this country and politicians naturally draw on members of the Public Service for scientific and technical advice. Authorities in applied chemical fields outside the Government-sponsored laboratories are, in the main, limited to those in industry.

(4) The affairs of the Institute are maintained chiefly by a small band of enthusiasts. Many members are apathetic and, judging by their poor response to the address cards for a membership list recently sent out and, on some members' parts, to the payment of subscriptions, have little interest in the Institute at all.

There are, therefore, considerable difficulties in the way of the Institute setting itself up as the authoritative body on chemical affairs in this country. Members are asked to consider carefully whether they wish to alter the character of the Institute, or whether the desired status in the community might not be more surely achieved by continuing to function solely as a learned society.

NEW REGISTRAR APPOINTED

D. J. Hogan, Dominion Laboratory, Christchurch, will take over the duties of Registrar of the Institute as from 1 May, 1959. Mr Hogan is a well known member of the Canterbury Branch. He has been Branch Secretary for a number of years and is at present Canterbury Delegate on Council. The appointment of one of our own members to this important Institute position, especially one with Mr Hogan's personality and wide knowledge of Institute affairs, will be a popular one and we all wish him well in his new duties.

The address will be:

REGISTRAR, N.Z.I.C. P.O. BOX 1826, CHRISTCHURCH.

The old Institute address, P.O. Box 250, Wellington, will be retained for secretarial use.

A POSSIBLE INDUSTRY FOR NEW ZEALAND*

D. F. WATERS†

AGRICULTURE in New Zealand appears to have reached a critical stage. In the early post war period, the problem of feeding and clothing a hungry, despoiled world, rapidly increasing in numbers, seemed to promise unlimited markets for all time. Unfortunately, the larger and needy section is so poor that many years must elapse before it becomes a useful market for New Zealand's products. The smaller group, once a reliable market, has by improved practices and subsidies, increased its own output and its demand for our exports is reduced. Moreover, this area is relatively static in population so that this market cannot be expected to increase. Indeed, if the European Common Market should be extended to agricultural products, this market might be seriously reduced. Modern fat technology has made margarine a serious competitor to butter so that the price of butter will always be restricted and in a similar manner synthetic fibres will act as a brake on wool prices.

To meet the demands of its own rapidly increasing population, New Zealand must expand production if standards of living are to be maintained or increased, but in view of the market position just mentioned, increased production of the same commodities would probably result in still lower prices and little net gain. More diversified production is more promising but has its limitations and risks. Too much faith cannot be placed in the market for New Zealand meat in the United States where prohibitive tariffs can be imposed at short notice to protect local producers. More diversified production for the local market could be just as efficacious in balancing our economy, if that production reduces our need to import. The most obvious crop to increase is wheat, the importation of which costs £5 million per annum. A less obvious crop to consider is sugar, which in this latitude means, of course, beet sugar.

To the New Zealander sugar usually means cane sugar and it may come as a surprise to find that in 1953, 37 per cent. of the sugar produced in the world came from beet. In the half century, the level has veered between 30 and 40 per cent., being lower in the war years. In this time, world production of sugar has trebled from 11 to 33 million tons.

*Based on Chairman's Address delivered to Waikato Branch, N.Z.I.C.

†Principal Scientific Officer, Rukuhia Soil Research Station, Dept. of Agriculture, Hamilton.

Sugar beet growing is closely associated in our minds with the densely populated countries of Europe. It is surprising to find large areas of beet grown in the United States, while Canada grows one fifth of its requirements as beet sugar. If one visualizes the map of the world and the southern hemisphere it will be found that only southern South America, Victoria and New Zealand lie outside the tropical sugar cane growing areas. New Zealand is the only country in the hemisphere isolated from a source of cane sugar. Climatically, we should follow the pattern in the northern hemisphere and turn to beet for our sugar.

There is a further point about cane sugar producing countries with the exception of Australia. Cane sugar areas are synomous with tropics and tropical countries are peopled by under-privileged races with a low standard of living— a source of cheap labour. In the past, this has been an important factor in determining the world price of sugar. The rapid dissolution of colonial empires, in which tropical production was highly organized by Western drive and knowledge for Western profit, has cleared the way for self determination. However, some Western ideas remain in the demand for a larger share of the rewards and it seems likely, therefore, that world sugar prices based on cane sugar must gradually increase as the living standards of these countries increase.

To return to our beet. A number of trials of sugar beet varieties were conducted in 1937 or thereabouts in New Zealand. The Department of Agriculture Chemical Laboratory was called on to analyse the beet grown for sugar content. N. T. Clare was given the job and he and the writer often discussed possibilities of sugar production in New Zealand and one idea that appealed was the combination of beet growing with the dairy industry. The present state of that industry forcibly reminded the writer of that possibility and hence this paper.

Briefly the suggestion is to use the water supply and steam generating plants of dairy factories in the slack season to extract and concentrate beet sugar for transport to refineries. Sugar beet would be grown on dairy farms as a dual purpose crop in place of the usual winter-feed, root crop. Figures available show that 1½ acres of sugar beet will produce as much stock food (in starch equivalent) as 1 acre of fodder beet, and in addition give a cash crop of sugar. In certain sandy areas of Holland, sugar beet is grown primarily for the tops and pulp,

and the sugar is regarded as a by-product. The tops may be stacked or ensiled for later use, and pulp may be used immediately or dried for storage. The substitution of beet for other roots should not involve much of a revolution in agricultural practice.

Besides being an established source of water and steam, the dairy factory is strategically situated to reduce freight costs to a minimum. Is there any reason why the staff of dairy units should not be profitably employed in this slack period, and even the factory organization itself could run the additional operations as a sort of dairy and sugar co-operative? The savings in overhead are obvious.

Another factor which appealed at the time was the potential sugar production per acre under New Zealand conditions. It was understood that at that time growers in England were paid a bonus for beet crops yielding over 12 per cent. sugar on the green weight. Beet tested at the laboratory ranged from 12 to 20 per cent. and the average of the better varieties would be about 18 per cent. Selection from the modern strains most suited to New Zealand conditions should enable beet to be grown consistently yielding 20 per cent. sugar. Gross yield figures are not readily available but 15 to 30 ton has been quoted. This checks up with British figures of a minimum of 20,000 beet per acre. As the beet are 2 to 3 lb or more in weight this would suggest that the maximum yield to be expected would be 6 ton of sugar per acre. If we assume that only 3 ton per acre could be extracted from the average crops, then the 100,000 ton of sugar imported last year by New Zealand could be grown on 35,000 acres. A workable unit would be about 7 acres so there would be need to be 5,000 plots of this area, or 25 farms round each of 200 dairy factories. Each factory would then be required to concentrate 500 ton sugar per annum.

Beet may be harvested over a period of two months or say 50 days, requiring an output of 10 ton per day and here is the first snag. Extraction will produce syrup containing about 12 to 15 per cent. sugar and to reduce this to syrup containing 50 per cent. sugar would require evaporation of 50 ton or 10,000 gal of water. Obviously the output of small factories would be less than this. More large dairy factories in the scheme, special sugar beet factories, or only partial replacement of cane sugar are alternatives.

When the earlier work was done, the world depression had affected both sugar and dairy prices so that beet growing was

not a very attractive alternative or supplement to dairy farming. During the World War II years, for example, when beet sugar production was suggested, dairy leaders were emphatically against condemning our farmers to the drudgery involved. More recently men such as Dr C. P. McMeekan, who have seen the modern sugar beet industry, are themselves suggesting it as a saving of import requirements.

Consider the manner in which the beet industry in Europe has been modernized—or one could say revolutionized.

Originally involving long hours of back breaking toil the industry has been mechanized to a considerable extent and every year new machinery is produced to improve and extend mechanization. Tractor-drawn equipment facilitates all the ploughing and subsequent operations in preparation of the fine level seed bed required for successful beet establishment, and subsequent mechanical cultivation. The beet family as a whole share one gave fault in that the seed, being fruits, are clusters of seed so that "singling" rather than thinning is required to prevent crowding of the plants. Today the practice is to treat seed chemically or mechanically to produce single seeds, increasing the percentage of single plants from 40 to 50 per cent. No doubt technical advances will improve on these figures. Russian workers have made progress in breeding a beet producing only single seeds. The aim would be to combine this property with the high sugar content of modern varieties.

A variety of machine thinners are available, and standard machines are adaptable for inter-row cultivation. Finally, machinery is used for topping and lifting the crops. Motor transport, tip trucks, front end loaders and all the modern bulk handling machinery can be called upon to reduce the cost of sugar production. Tank wagons could be used to carry syrup to the refinery.

In two other fields, considerable assistance is available. Modern weed eradication technique cannot fail to reduce work required for weed control. Topdressing trials have determined the manurial requirements of the crop. There should be no excuse for crop failure through lack of knowledge.

Successful beet production calls for a good deep rich soil. That this soil is not always used for beet in England in evidenced by this extract from a recent paper describing a demonstration of beet machinery;

> The soil varied from sandy loam to outcrops of limestone with very stony conditions predominating. Owing to-

snow and heavy rainfall, drilling had been impossible till 11 April. Wind and frost reduced the plant population on 20 acres of stone free soil making it inadvisable to thin by machines which were confined to the stony section.

It would be difficult to reproduce such depressing conditions in the dairying districts of New Zealand. The yellow-brown loams of Waikato and some of the better pumice soils should be ideal free working well drained soils with adequate rainfall. Taranaki would probably be too wet as excess soil moisture in summer appears to reduce the sugar content of beet. However, much of the work recorded is for Europe where increased soil moisture may be associated with decrease of sunshine and trials under New Zealand conditions are very necessary to determine possible beet growing areas and soil types.

Again in Europe, a favourable economic yield has been obtained by the use of a nitrogen : phosphate : potash ratio of 10 : 8 : 12 but undoubtedly this would be for soils cropped under some rotation. Ideally, the New Zealand dairy farmer should follow the advice of Sir Bruce Levy and plough a proportion of his pasture each year to renew its vigour by introducing new improved strains of grass and clover and to "cash in" on the accumulated nitrogen. Here then is a substitute for most of the nitrogen in the recommended mixture. Phosphate required would be no more than normally applied to the land for pasture. Potash might be doubled, but here again a saving is possible. Sodium as an element is indispensible to the growth of the sugar beet plant and will supplement potassium up to 50 per cent. without loss of production. It is quite possible that local salt, in a relatively impure state, could be used with equal parts of potassium sulphate to extend that fertilizer. Alternatively a side dressing of salt could be used to supplement the potash and act as a weedicide. The salt should not adversely affect the physical condition of the soils suggested for beet. After harvesting the sugar crops and feeding off the tops, the residue of fertilizer applied, the fine roots left in the soil, and stock excreta, when worked in, should enable grassing-down again at reasonable cost. Experience may show that two successive crops may be possible before grassing down.

An extension of the salt need of sugar beet suggests the use of saline soils of Ahuriri Lagoon and Ellesmere for specialized beet production. Here the industry would be combined with fat lamb production to utilize by-products. It is highly prized

for this purpose in England. The possibility of using meatworks in lieu of dairy factories for steam and water should be investigated.

All the steam utilized in concentrating the sugar extract to syrups would require coal and would give a needed outlet for that industry which shows a downward trend. Efficient modern factories use 0.13 ton coal/ton of sugar.

The extraction of sugar from beet is a simple process. The beet is washed, cut into cubes, and extracted by counter-current flow to produce syrup containing 12 to 15 per cent. sucrose. A recent method requires the addition of lime to the cubes and then pressure will express about half the sucrose, the balance being extracted by diffusion. The use of diffusion is favoured as the juice then contains much less protein and other matter. The juice is strained, 1 to 2 per cent. hydrated lime added and the mix heated to 85°C. The lime neutralizes acids and precipitates proteins and calcium salts of organic acids. Excess lime is removed by the addition of carbon dioxide, the precipitate of calcium carbonate also serving to absorb non-sugar impurities. Under the right conditions a complicated reaction between calcium carbonate and sugar produces a gel which clarifies the juice.

The juice is then concentrated to 50 to 60 per cent. sugar by weight. Further concentration requires vacuum pans. It is interesting to note the use of felt bags in early sugar factories for filtering out sugar crystals. These set in a conical mass the shape of the bag giving rise to the term "sugar loaf".

A suitable refinery for the final purification and crystalization of the sugar already exists in New Zealand. Were a second refinery to be required this could be located near the coalfields and the farms of the Waikato.

It is tempting to suggest that, as the better pumice soils are known to produce good swedes, the Taupo district could be a specialized beet/fat lamb area and that the central refinery could be located near Wairakei or Waiotapu to utilize free steam and water—two most necessary requirements. The erosion on pumice soils under crops and their general poverty in potash together with high rainfall might preclude the Taupo district as a beet growing area, but it might still be considered as a refinery site.

It would, of course, be impossible to change over in a year or two to beet sugar. A more cautious approach would

start with an experimental extraction plant using the steam output of one dairy factory. The beet would be grown under experimental conditions on co-operating farmers' fields. If as successful as the writer thinks it would be, the area could be extended annually in units calculated to cover the increased demand for sugar in this country.

It has been calculated that the population of New Zealand, at present about 2½ million will be 5 million by the year 2,000 A.D. New Zealand's present sugar requirement of 100,000 ton will likewise be doubled. By starting to grow its own sugar, New Zealand should be able to hold imported sugar to its present level or even reduce it. Remember that there will be double the number of workers in the country and it may be difficult to find profitable occupation for all. A well-planned project for sugar production could confer the following benefits.

(1) Hold or reduce overseas exchange required for sugar.

(2) Provide a cash crop for dairy farmers, the value of which could be isolated from overseas market fluctuations which cannot be said for dairy produce, *i.e.*, New Zealand could subsidize sugar but not butter.

(3) Provide a new industry giving new jobs for full time workers and work for seasonal workers.

(4) Increase coal consumption.

(5) Require considerable manufacture of agricultural machinery for handling the beet crop and processing machinery for the sugar.

Regarding costs and returns, it will be appreciated that, in the absence of recent trials using modern machinery and methods, only a rough idea of costs can be gauged for New Zealand conditions. Nevertheless it is clear that, if dairy prices continue to be low, specialized sugar beet production could be a profitable alternative. Under the Commonwealth Sugar Agreement, New Zealand buys 75,000 ton raw sugar per annum from the United Kingdom Ministry of Food. This agreement lasts until 1963. Here then is the opportunity to regain New Zealand's own market for local products.

LINE DRAWINGS FOR LANTERN SLIDES

H. R. PENHALE*

Despite the many excellent articles on this subject, it is apparent from the standard of slides still being used—even at Institute conferences—that many speakers still have difficulty in planning their slides. Those who are not conversant with making lantern slides may find the following brief synopsis useful for quick reference.

TABLE 1: HEIGHT OF LETTERS AND THICKNESS OF LINES
(as fraction of longer side of drawing)

	Height	Line thickness
Lettering	1/40 - 1/80	(1/6 - 1/8 height of letters)
Graphs:		
Curves		1/150 - 1/300
Axes		1/250 - 1/500
Grid lines		1/300 - 1/600 (grid lines are usually unnecessary)

TABLE 2: SIZE OF LETTERING
(Calculated from Table 1)

Longest side of drawing		Height of Lettering					
		Excellent		Good		Just acceptable	
in.	mm	in.	mm	in.	mm	in.	mm
4	10	0.1	2.5	0.07	1.8	0.05	1.2
8	20	0.2	5	0.15	3.5	0.1	2.5
12	30	0.3	7.5	0.2	5	0.15	3.5
20	50	0.5	12	0.35	9	0.25	6
30	75	0.75	20	0.55	13	0.35	9

These sizes may seem unnecessarily bold but it should be remembered that the width of projection screens is rarely more than one sixth the length of lecture rooms and smaller screens are sometimes used. Hence, test drawing by looking at it from eight times the length of its longest side. If it cannot be read from this distance the slide will not be clear from the back of the room. Tables, diagrams, graphs, and maps in books and journals rarely meet the standards above and will need simplifying and redrawing in bold lines before photographing. The smallest lettering given in the tables should be used only if unavoidable, not just because it is hard to read, but because it

*Soil Bureau, D.S.I.R., Wellington.

will tempt lecturers to include too much detail. The size of lettering is a guide to the smallest detail suitable for diagrams.

Completed slides can be checked for legibility in the same way as the original drawing. They should be readable from a distance of eight times their longest side, *i.e.*, 12 in. for 35 mm slides (2 × 2 in. when mounted), and 20 in. for 3¼ × 3¼ in. slides.

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Dolby, R. M. (1955): *J. N.Z. Inst. Chem., 19* : 51.
Saxby, S. H., Scott, R. H., and Averis, M. W. (1954): *N.Z. J. Sci. Tech., 36B* : 191.
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CONFERENCE — 1959

Conference will be held this year in Dunedin at the Chemistry Department of the University of Otago. Conference will open with a "get-together" on Tuesday evening, 25 August, and close with a dinner and social function on Friday evening, 28 August.

Invitations have been issued to three prominent chemists to attend and present papers. They are Dr J. F. Duncan of the Chemistry Department, University of Melbourne, who will be in this country at the time as the guest of the University of New Zealand to give a series of lectures and a course in radiation chemistry; Dr P. B. D. de la Mare, Reader in Chemistry at University College, London, a former graduate of the Victoria University of Wellington and well known for his contributions in the field of reaction kinetics; and Dr R. L. M. Syngé, F.R.S., of the Rowett Institute, Bucksburn, Aberdeenshire, Scotland, well known for his studies in the field of amino acids and their chromatographic separations, and who is at present working at the Ruakura Animal Research Station, Hamilton.

We have again been fortunate in obtaining accommodation at Carrington Hall which was very highly spoken of after the 1953 Conference. Accommodation at a cost of about 27s. per day will be available for both men and women. Bookings will also be available at an hotel (5 star equivalent) for those who prefer such accommodation. Provided the numbers participating are sufficient, it is hoped to arrange post-conference tours as follows:

(1) A one day trip to Roxburgh on Saturday, 29 August at an approximate cost of 30s.

(2) A two day tour of scenic Southland on 29 and 30 August. Cost will depend on numbers but will be approximately £10.

We ask members to note that Conference will be followed by the Fourth Triennial Mineral Conference at the School of Mines and Metallurgy, University of Otago, from 1 to 3 September.

SEEING CHEMISTRY AT WORK

Lectures and Laboratory Visits for Sixth-Formers from Auckland Schools

FOLLOWING the successful Canterbury effort earlier in the year, the Auckland Branch arranged two lectures for sixth-formers from local schools. Prof. D. R. Llewellyn and S. G. Brooker were the speakers and both lectures were followed up by a series of visits to chemical laboratories; the Branch Committee feeling that this would further bring forward the possibilities of chemistry as a profession. It was felt that the majority of pupils on leaving school were unaware of the type of work carried out in chemical laboratories, and of the opportunities that existed in the chemical field. This could best be rectified by letting the pupils see for themselves what is actually being done in these laboratories and meet the people in the profession.

Accordingly a sub-committee was set up to arrange visits to both industrial and research laboratories during the last week in November. The majority of laboratories approached were extremely interested and keen to participate in the scheme.

A total of 15 schools took part in the scheme, involving some 300 sixth form pupils. This number was rather small considering the number of sixth form pupils in Auckland, but this was probably because of school and external examinations. Each pupil was able to visit one research laboratory and one industrial laboratory during the week. By keeping the groups small, about 8 to 10, it was possible for everyone to see the laboratory at work at close range and to meet members of the laboratory staff on a semi-individual basis. It was considered that this closer contact between the pupil and the laboratory would create greater interest than would large-scale conducted tours.

The results were most gratifying. The visitors took considerable interest in what they saw, and many interesting and formative discussions arose. One common enquiry concerned the number of positions available for technicians, prospects for future advancement, etc. Some industrial laboratories have since received letters from pupils who visited their laboratories, requesting this type of information. Unfortunately no such general information seems to exist, and we are left with several questions to which, at the moment, we have no answers.

How many vacancies occur each year in laboratories in, say, Auckland? What qualifications are required to fill these positions? What salaries go with these positions? What prospects are there for advancement in the various laboratories?

It is hoped that information along these lines will be available before a similar scheme of visits is put into operation next year.

CONDITIONS COVERING AWARD OF PRIZES

At the Council meeting of 20 February, 1959, new regulations for the Institute prizes were approved. All prize applications and nominations must be in the hands of the Honorary General Secretary by 30 April, in the year of award.

REGULATION 3

3.1. The Chemical Essay Prize

3.1.1. The New Zealand Institute of Chemistry shall offer annually a prize for an essay or review paper dealing with any aspect of chemical science.

3.1.2. The prize shall be open to all members and local members of the Institute.

3.1.3. Articles published in the *Journal of the New Zealand Institute of Chemistry* in the twelve month period immediately preceding the closing date for entries may be considered for the award, but in all other cases the author must submit the article for consideration.

3.1.4. The essay or review should preferably be restricted to a length of 6,000 to 10,000 words, and shall be in a form suitable for publication. Review papers already published may be submitted provided that they were published not more than twelve months prior to the closing date for entries.

3.1.5. The Institute shall have the right to publish the winning essay or review, if not already published.

3.1.6. Applications, in completed form, must be received by the Honorary General Secretary not later than 30 April in the year of the contest.

3.1.7. The entries shall be judged by a committee of examiners set up by Council for the purpose. The President of the Institute and the Editor of the *Journal* shall be *ex officio* members of this committee.

3.1.8. The award shall be made by the Council after consideration of the report of the committee of examiners, and the presentation of the prize shall be made, whenever possible, at the annual conference of the Institute.

3.1.9. No award shall be made if, in the opinion of the committee of examiners, there is no entry of a sufficiently high standard of merit.

3.1.10. While the entries are to be judged primarily as contributions to the development of chemistry in New Zealand, a reasonably high standard of literary work, and particularly of clarity of expression, will be required.

3.1.11. The value of the prize shall be such sum as the Council may from time to time determine, and the prize shall be spent on books or instruments to the satisfaction of the Council.
(NOTE: The value of the prize is at present £25.)

3.1.12. Due notice drawing attention to the prize shall be given in the *Journal*.

3.2. The I.C.I. Prize

This prize of twenty-five guineas and a medallion has been donated by Imperial Chemical Industries (N.Z.) Ltd.

The conditions of the award are as follows:

3.2.1. The prize shall be awarded to a member of the Institute who, in the opinion of Council, has made some major contribution to some

branch of chemical science, this contribution to be judged by research work published or accepted for publication during the five years immediately preceding 30 April in the year of the award.

3.2.2. Applications by members, or nominations, which may be submitted by Branch Committees or by individual members, must be accompanied by copies of papers presented in support of the entry. The Council itself may nominate candidates for the award.

3.2.3. A nomination or application, once made, shall stand for five years, but material which fails to satisfy clause 3.2.1. shall automatically be deleted, and additional material may be presented at any time.

3.2.4. If in the opinion of the Council there is no candidate of sufficient merit, the Council may refrain from making the award.

3.2.5. The prize shall be presented at the annual conference of the Institute or at a meeting of the Branch to which the prize-winner belongs.

3.2.6. A member to whom the prize has been awarded shall not be eligible for re-nomination.

3.3. The Morcom Green, Edwards Prize

This prize is donated by Messrs. H. H. Edwards and Morcom Green.

3.3.1. This prize shall be referred to as the "Morcom Green, Edwards Prize".

3.3.2. The value of the prize shall be £25.

3.3.3. The prize is offered for the encouragement of original work by young chemists in pure and applied chemistry, with emphasis on applied chemistry, and shall be open to any member of the New Zealand Institute of Chemistry actually living in New Zealand who has not attained the age of 35 years on the 1 June in the year of the award.

3.3.4. Applications by, or on behalf of, candidates for the award must be received by the Honorary General Secretary not later than 30 April in the year of the contest.

3.3.5. (i) The President and the Vice-President shall consider the applications and shall submit a report thereon together with their recommendations to the August meeting of Council. They may appoint one or more assessors to assist them if necessary.

(ii) A candidate will be assessed on:

(a) Work he has published, or
(b) A process he has designed or developed, or
(c) The product he produces, or
(d) Any other factors appropriate to the circumstances.

Special consideration will be given to work done during the year prior to the application.

3.3.6. There shall be no award made if, in any year, no suitable candidate is forthcoming. In this case the moneys shall be retained for the purpose of awarding an additional prize when circumstances warrant.

3.3.7. An applicant may, upon request, sustain his application for one year, after which fresh application must be made.

3.3.8. The prize shall be awarded at the annual conference of the Institute, or at a meeting of the Branch to which the winner belongs.

BRANCH NEWS AND NOTES

New Year Honours

¶ We regret the omission of the name of Dr M. M. Burns, Director, Canterbury Agricultural College, from the list of Fellows of the Institute who received awards in the 1959 New Year Honours. A Past-President of the Institute, Dr Burns received a C.B.E. and all members will join in offering him our congratulations.

Auckland Branch

¶ Associate Professor H. Bloom, University of Auckland, has been invited to present papers on the investigation of molten salts at a New York Academy of Sciences conference in April and at the Gordon Research Conference, New Hampshire, United States, in September.

¶ R. N. Seelye has been promoted to Senior Lecturer in Chemistry at the University. Mr Seelye will leave in August for Oxford University where he will study at the Dyson Perrins Laboratory under Prof. E. R. H. Jones.

Manawatu Branch

¶ Congratulations to Dr H. R. Whitehead on his appointment as Director of The Dairy Research Institute (N.Z.). Dr Whitehead was formerly Deputy Director and Chief Bacteriologist. Dr F. H. McDowall, Chief Chemist, has been appointed Deputy Director and Dr W. A. McGillivray, Senior Lecturer in Biochemistry, Massey College, will be joining the Institute staff in August as Chief Bacteriologist.

¶ Dr D. Russell has commenced work at Plant Chemistry Division as a Facial Eczema Research Fellow. Dr Russell has come from the Mill Hill Medical Research Laboratories and is particularly interested in the structure and synthesis of cyclic peptides. He is studying the nature of the 'beaker test' substance which is produced by the 'facial eczema' fungus.

Wellington Branch

¶ P. P. Williams, Dominion Laboratory, Lower Hutt, and Secretary, Wellington Branch, and Dr R. B. Johns of the Victoria University of Wellington, have both been awarded National Research Fellowships.

Canterbury Branch

¶ M. D. Carr, a graduate of the Victoria University of Wellington, has been appointed Assistant Lecturer in Chemistry at the University of Canterbury. In August he will leave to take up a Shell Scholarship at University College, London.

¶ A. H. Hunt, formerly of H. F. Stevens Ltd., has taken over the consulting practice of P. J. Radford who has left this country to work in Canada.

¶ Following the success earlier in the year of the symposium for sixth form children, "Chemistry in Action", the Canterbury Branch organized a lecture-demonstration on paper chromatography. This was given by Dr R. M. Allison, Crop Research Division, and L. Wilkinson, Dominion Laboratory, at the end of November, 1958. It was designed for the

upper sixth form students of chemistry and the object was to provide something outside the normal syllabus for a group who were already keen on chemistry. There was an excellent response and the limitation on numbers which again proved necessary ensured an enthusiastic audience. After the meeting, members of the Branch met the chemistry teachers to discuss the desirability of holding similar meetings in the future. It was agreed that such evenings would stimulate great interest among senior pupils and it was decided to hold two in 1959, at the beginning of the second and third terms. The possibility that regular meetings of this kind could lead to the formation of a secondary schools chemistry society, similar to the Mathematics Club or the Junior Historical Society, is being borne in mind.

COUNCIL SUB-COMMITTEES

(*Continued from p.30, February issue*)

Conference Committee: Chairman: A. D. Campbell.

Employment Committee: J. L. Mandeno, 1 Pine Terrace, Wellington, W.3.

Examination Committee: C. R. Edmond (Chairman); T. H. Kennedy (Secretary), Medical School, Gt. King Street, Dunedin.

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Membership Committee: S. G. Brooker, P.O. Box 9012, Auckland. Dr J. K. Dixon, Soil Bureau, Molesworth Street, Wellington. Dr. R. Gardner, 41 Dowling Street, Dunedin.

Professional Status Committee: Not appointed.

Standards Institute of New Zealand: Representative on N.Z. Standards Institute Council, G. A. Lawrence; Chief Representative for all Standards Institute affairs, L. H. Stonyer.

Representatives on Special Committees:

Chemical, insecticides, domestic refrigeration etc., C. L. Stonyer; Road making materials and methods etc., J. B. Hyatt; Electroplating and electrometal finishes, Dr R. Gardner; Metal containers, paints etc., J. M. Tingey; Textiles: Dr. L. F. Storey.

UNESCO Representative: J. A. D. Nash.

Salaries Committee: G. S. Lambert (Chairman).

Book Reviews

PAPIERCHROMATOGRAPHIE, by Friedrich Cramer (Fourth Edition). Published by Verlag Chemie, 1958. *Price,* DM 21.

THE inherent soundness of this book as a summary of the various applications of paper chromatography is revealed by the fact that since the first edition appeared in 1951 it has run to four editions and increased in size from 89 to 215 pages. The material is excellently presented and in the sections dealing with particular classes of substances there is a balanced selection of examples from the massive literature which now exists. The book makes no pretense to be a complete reference source on the subject and gains from this in not being so voluminous and involved as some other books on the subject. The text is well illustrated with 91 well-drawn diagrams, 8 colour plates and 109 tables. The principles and practice of paper electrophoresis are given ten pages and inorganic paper chromatography 15 pages. One might criticize the brevity of the treatment of these two rapidly expanding parts of the field—probably the author considers that they are in too great a state of flux at the present stage. This text can be confidently recommended as a conveniently sized handbook for students and research workers—its clarity makes it a good exercise in scientific German.

G.W.B.

HOUBEN-WEYL: METHODEN DER ORGANISCHEN CHEMIE (Fourth Edition). Edited by Eugen Muller. Published by Georg Thieme Verlag, Stuttgart, 1958. Vol. XI, Part 2, 844 pp. *Price,* DM. 155.

THE latest addition to this fine series has a long chapter dealing with the transformation of amines into various derivatives such as amides, isonitriles, N-halogen compounds, nitramines, amine oxides and other oxidation products; also the elimination of the amino group. Other nitrogen compounds discussed are alkyleneimines, amino acids, lactams, quarternary ammonium compounds, and the nitrogen-sulphur group. These volumes can be highly commended for their excellent coverage and the fine way in which the material is presented. The printing and binding are beyond reproach.

S.G.B.

BIOCHEMICAL PREPARATIONS, VOL. 6. Editor in Chief: C. S. Vestling. Published by John Wiley, New York, 1958. 105 pp. *Price,* 5.25 dollars.

THIS NEW VOLUME maintains the previous high standard of presentation of thoroughly detailed methods of biochemical preparation which have been proved to work. In this volume a further nineteen preparations are listed, included among them being methods for crystalline animal cytochrome C, desoxyribonucleic acid, insulin, crystalline papain, DL Tryptophane-7a-C^{14} and many others.

G.M.W.

A MODERN APPROACH TO ORGANIC CHEMISTRY, by J. Packer and J. Vaughan. Published by the Oxford University Press, London, 1958. 973 pp. *Price,* 84s. (STG.).

IT WAS with very great pleasure that we received for review a book of this type written by two well-known members of our Institute. The title of the text is self explanatory to all those who are familiar with the Canterbury approach to organic chemistry—the emphasis is very strongly on the reaction mechanism side. This must inevitably draw criticism from

the proponents of the "preps. and props." approach and from those who do not adhere to the particular theories advanced in this text. But a book of this type is not to be judged on whether we agree or not with the particular method of presentation. The text is a very sincere attempt to develop organic chemistry in a logical manner presenting relevant theory alongside factual knowledge. This approach has, of course, necessitated a number of departures from the more usual methods of presentation and an immediate reaction is that this book, as a class text, would demand more of students than is the case with orthodox texts—a very good thing. Students would, for example, have the very valuable exercise of preparing their own list of preparative methods.

On the debit side, although general principles and industrial processes are well covered, it seems unfortunate that in a volume of this size more space could not have been devoted to natural products and what may be regarded as the biochemical aspects of the subject—perhaps in a second edition . . . In the meantime this deficiency places the book in the auxiliary reading rather than standard text catagory.

Technically the publication is of the usual Oxford Press standard. Formulae, equations, tables, etc., are well and clearly set out. The price is extremely modest.

Most teachers will wish to refer their students to this text and all will want it on their own bookshelves.

CAHIERS DE SYNTHESE ORGANIQUE, VOL. IV, by J. Mathieu and A. Allais. Published by Mason et Cie, Paris, 1958. 272 pp. *Price*, 5,000 Fr.

THE EARLIER VOLUMES in this series were reviewed in the April, 1958, issue of this *Journal* (*J. N.Z. Inst. Chem.*, 22 : 74), and this one follows the same pattern. It deals exhaustively with acylation in the aliphatic and aromatic fields. The material is well arranged, giving some account of each method with full references but no experimental details. The reviewer is not aware of any other volumes on organic chemistry with quite the same approach. In common with many other books published today, the price seems rather high.

S.C.B.

ZIRCONIUM (System No. 42 of the 8th Edition of Gmelins Handbook of Inorganic Chemistry). Published by Verlag Chemie, Weinheim/Bergstr. (West Germany), 1958. 448 pp. *Price*, DM 261 (in wrappers), DM 266 (cloth bound).

THIS VOLUME covers the literature to December, 1949. A detailed account is given of the occurrence of zirconium in nature followed by sections on the physical properties of the element, its alloys with metals of lower System Number. The technical preparation of zirconium compounds by ore-dressing, separation processes, purification of the ore by chemical means, and decomposition of the ore, as well as the technical preparation of several special zirconium compounds, are likewise thoroughly treated.

An added section in the zirconium volume reviews the practical applications of this element as an industrial material, its use in the vacuum and electrical engineering fields primarily on account of its gettering action, its use as an alloy constituent, the uses of ZrO_2 and several other zirconium compounds, such as preparation of highly refractory bodies, and its use as a catalyst as well as its uses in the illumination and electronics industries.

The chapter on the preparation of elemental zirconium contains in addition to the principal methods for preparation of the pure metal by the iodide and Kroll processes, procedures for the preparation of special forms such as zirconium powder, coatings, wire and colloidal zirconium.

The chemical reactions of the element with metals and non-metals, salts, acids and bases are described; moreover, the reaction with hydrogen, air and oxygen as well as nitrogen have been elucidated. The general reactions of zirconium salts with those of Hf salts are somewhat more thoroughly treated on account of their general analytical importance.

H.B.

OXYGEN, Section 3: Elementary Oxygen (System No. 3 of the 8th Edition of Gmelins Handbook of Inorganic Chemistry). Published by Verlag Chemie, Weinheim/Bergstr. (West Germany), 1959. 518 pp. *Price*: DM 283.

THIS volume is devoted to elementary oxygen, its preparation and certain chemical properties. After discussing its preparation and separation of its isotopes, 275 pages are devoted to its physical properties. The reactions discussed consist of electrochemical reactions including standard potential, cells and overvoltage, together with a very detailed (195 pages) description of reaction in hydrogen-oxygen mixtures. Besides the photochemical reaction and the surface reaction, the homogenous thermal reaction is treated in full. A discussion is given for both the explosive and continuous reaction regions. Data on flame temperature, flame velocity, ignition limits, with consideration of additions of inert and combustible gas, as well as on ignition temperature, complete the volume.

The chemical reactions of oxygen apart from those listed above are omitted in this volume as they are treated in the volumes of the respective elements.

H.B.

CHOLESTEROL, by David Kritchevsky. Published by John Wiley, New York, 1958. 291 pp. *Price*, 9.75 dollars.

THIS text is an attempt to provide a centralized source of information on the biological function and significance of cholesterol. The author has rightly felt that because of the many venues of approach to the study of this complex substance, workers in one area are often denied easy access to data available to others. Accordingly he has attempted to cover the chemistry, biochemistry, and physiology of cholesterol and has gathered together a great deal of information which has previously been widely dispersed through chemical and medical literature.

Topics covered include the chemistry, biosynthesis, absorption and transport of cholesterol; the metabolism of cholesterol; cholesterol in disease states; blood cholesterol; and the analysis of cholesterol. An extensive appendix covers the physical properties and constants of cholesterol and the cholesterol content of foods and various human and animal tissues. There are over 2,000 references to original literature and the text is well and clearly illustrated with structures, etc. A very valuable and useful text particularly with the current interest in cholesterol and related materials in connection with arteriosclerosis.

W.A.McG.

OUTLINES OF ENZYME CHEMISTRY (Second Edition), by J. B. Neilands and Paul K. Stumpf. Published by John Wiley, New York, 1958. 411 pp. *Price,* 8.50 dollars.

THE FIRST EDITION of this text was given a very favourable review in this *Journal* in 1957 (*J. N.Z. Inst. Chem., 19,* 88). Extensive use of the book since that time has confirmed the opinion then expressed, and this second edition, revised in the light of newer developments, is therefore particularly welcomed. The same general approach to the topic is retained but a great deal of new material has been added including chapters dealing with metal ion bonding, the mechanism of enzyme action, and the dynamics of nucleotide transformations. There is also a list of over 500 enzymes giving general characteristics of each enzyme and a reference to the research literature.

W.A.McG.

THE PHYSICAL CHEMISTRY OF STEELMAKING, edited by John F. Elliott. Published by the Technology Press of the Massachusetts Institute of Technology and John Wiley, New York, 1958. 257 pp. *Price,* 15 dollars.

THIS VOLUME contains 43 papers presented at an international conference on the physical chemistry of iron and steel making, organized by the Metallurgy Department of M.I.T. and held at Dedham, Massachusetts in 1956. A summary of the subsequent discussion follows each paper.

The topics covered include liquid metals and properties of solutes of these; melt and slag-metal equilibria and kinetics, behaviour of metal oxides; solidification of castings and ingots; application of fundamental data to process development; research planning. While then the scope of the papers is wider than implied by the title of the symposium, the more valuable contributions are confined to aspects of physical chemistry proper.

Particularly interesting are several papers on the determination of the activity of carbon in liquid iron solution by the CO/CO_2 ratio and the H_2/CH_4 reaction, and those dealing with the mechanism of chemical reactions in liquid metals. Prof. F. D. Richardson of Imperial College contributed three very readable papers, including a survey of present knowledge of oxide slags. Less successful are papers tackling further fields, such as chemical engineering: a study of slag-metal mixing by a model, in which a sodium amalgam represented the metal and a sulphuric acid solution the slag would be expected to represent a fruitful approach, as the theory of similarity is relatively well developed for such mixing processes. The author of the paper does refer to various criteria of similarity, but found himself unable to apply them to his results, which then have not only no significance quantitatively, but as the discussion elicited, even a qualitative interpretation would be doubtful.

The book is attractively printed and bound. While an index is provided, there are no summaries of the various papers, and their distribution into sections appears to have been made on the basis of the proposals for the conference, rather than on their content as received.

In conclusion, it may be worth quoting from the Preface:

> The discussion (of each paper) were renewed on a very informal basis over a cup of tea, during dinner, or on the patio. It is felt that one of the primary benefits of the conference was derived from the associations made and the viewpoints exchanged during these informal

discussions. Unfortunately, these benefits can neither be chronicled nor transmitted on the printed page.

New Zealand scientists can only regret their very restricted opportunities for participating in such conferences.

R.G.H.P.

Books Received

NEW CHEMISTRY (a *Scientific American* Book). Published by G. Bell and Sons Ltd., London, 1958. 206 pp. *Price*, 13s. 6d. (STG.).

LIKE other *Scientific American* books this is a selection of topics based on articles which have appeared recently in the magazine. It represents a sampling of the current activities and achievements in chemistry from basic research to industrial applications. A most useful book at a very modest price.

A DICTIONARY OF NAMED EFFECTS AND LAWS, by D. W. G. Ballentyne and L. E. Q. Walker. Published by Chapman and Hall, Ltd., London, 1958. 205 pp. *Price*, 30s. (STG.).

THIS is intended as a dictionary which can be quickly consulted whenever the reader is confronted by the mention of a rule or law or relationship named after someone who has worked possibly in quite another field. For its size the cover is exceptionally wide and the information is presented in a clear concise form.

TABLES OF INTERATOMIC DISTANCES AND CONFIGURATION IN MOLECULES AND IONS. Published by the Chemical Society, London, 1958 (Special Publication No. 11). *Price*, 42s. (STG.).

THIS second, and very much enlarged, edition has its origin in the collection of results from electron-diffraction studies on gases made by Dr P. W. Allen about ten years ago. The present edition, which covers results available up to the end of 1955 only, deals with interatomic distances and bond angles in gaseous molecules, in molecules occurring in the solid state, and in complex ions occurring in the solid; with interatomic distances in crystals for pairs of simple ions which have been observed or reported as molecules or as ion-pairs in the vapour; with interatomic distances in adamantine lattices when these are of interest for comparison with distances found in simpler molecules; and with interatomic distances in the metals.

CHEMICAL TRANSFORMATIONS BY MICRO-ORGANISMS, by Frank H. Stodola. Published by John Wiley and Sons, Inc., New York, 1958. 134 pp. *Price*, 4.25 dollars.

THIS is the second volume in the series of E. R. Squibb Lectures on Chemistry of Microbial Products. It provides an excellent review of literature relating to three topics of research in microbiological chemistry—the chemical composition of the organisms; the organic type reactions they carry out; and their synthetic powers.

PLANNING OF EXPERIMENTS, by D. R. Cox. Published by John Wiley, New York, 1958. 308 pp. *Price*, 7.50 dollars.

AN ACCOUNT of the modern ideas on the statistical aspects of experimental design. The virtual absence of statistical and mathematical technicalities will make this text most acceptable to experimental workers.

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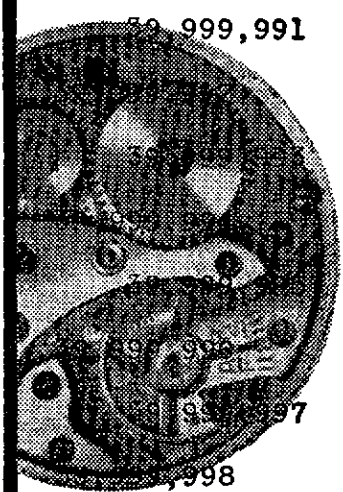

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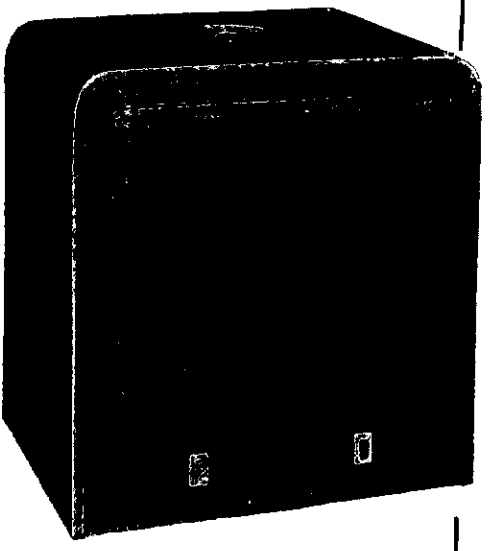

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